



# CLIMATE DETECTIVES 2020 – 2021

## CLIMATE CHANGE IN BADAJOZ

Detectives del SanFer III  
IES SAN FERNANDO



### RESEARCH QUESTION

To what extent can one perceive the effects of Climate Change in Badajoz?

### SUMMARY OF PROJECT

Our team has worked in two aspects:

On the one hand we have learned to work on the EO-Browser platform in order to obtain information on different aspects such as the state of the vegetation quality, using the NDVI index, the levels of concentration of certain gases that contribute to the greenhouse effect such as CH<sub>4</sub> or the study of the evolution of urban surfaces in the region.

Secondly, we have made a great effort to build and program our own atmospheric monitoring station. For this, we have presented a work plan to the IBERCIVIS foundation within the framework of the DESAFÍO BAJO CERO project. <https://ibercivis.es/project/desafio-bajozero/>. Thanks to this initiative, the students have been able to learn about the operation and programming of sensors in Arduino. Thanks to the material that they sent us from the foundation, we built our environmental monitoring station and learned to program the sensors with Arduino and share our data in real time through a ThingSpeak platform. At the station we installed sensors for: CO<sub>2</sub>, volatile organic compounds (TVOX), temperature, humidity, luminosity and ultraviolet radiation.

We have launched several initiatives in the center to promote recycling as well as reuse workshops. We are also participating in a national study on the biodiversity of insectivorous birds of the Ibercivis foundation called Pájaros en la nube.



Figure 1: DESCRIPCIÓN DEL PROYECTO

### MAIN RESULTS

We have worked intensively with the EO-Browser platform and studied different aspects of Extremadura: Using the unit Monitoring the Earth from space and the Sentinel 2 satellite, we have performed a search using the NDVI index. With the images obtained from our region throughout all the months of 2020, we have observed how the seasons make this index vary between 0.2 and 0.5, as corresponds to areas covered with herbs or temperate forests. The values in these months are lower. Figure 1

Using the topic Atmosphere and Air Pollution and the Sentinel 5 satellite, we studied during 2020: CH<sub>4</sub> levels remain high, between 1800 and 1900 ppb. Figure 2, probably due to rice crops.

NO<sub>2</sub> levels, which, as can be seen in the images, remain at 0 moles / m<sup>2</sup> Figure 3.

We have studied the area of the main urban centers in the region, whose growth may also be helping to increase the greenhouse effect.

Using our Arduino sensors we have started to measure some pollutants such as CO<sub>2</sub>, TVOX and other atmospheric variables such as humidity or ultraviolet radiation. We hope to continue being able to develop this line of research and monitor the atmosphere of our city. The data can be consulted at: <https://thingspeak.com/channels/1356022>

We can conclude that the tools we have learned to use are powerful tools that will allow us to continue studying the effect that global warming is having on our region.

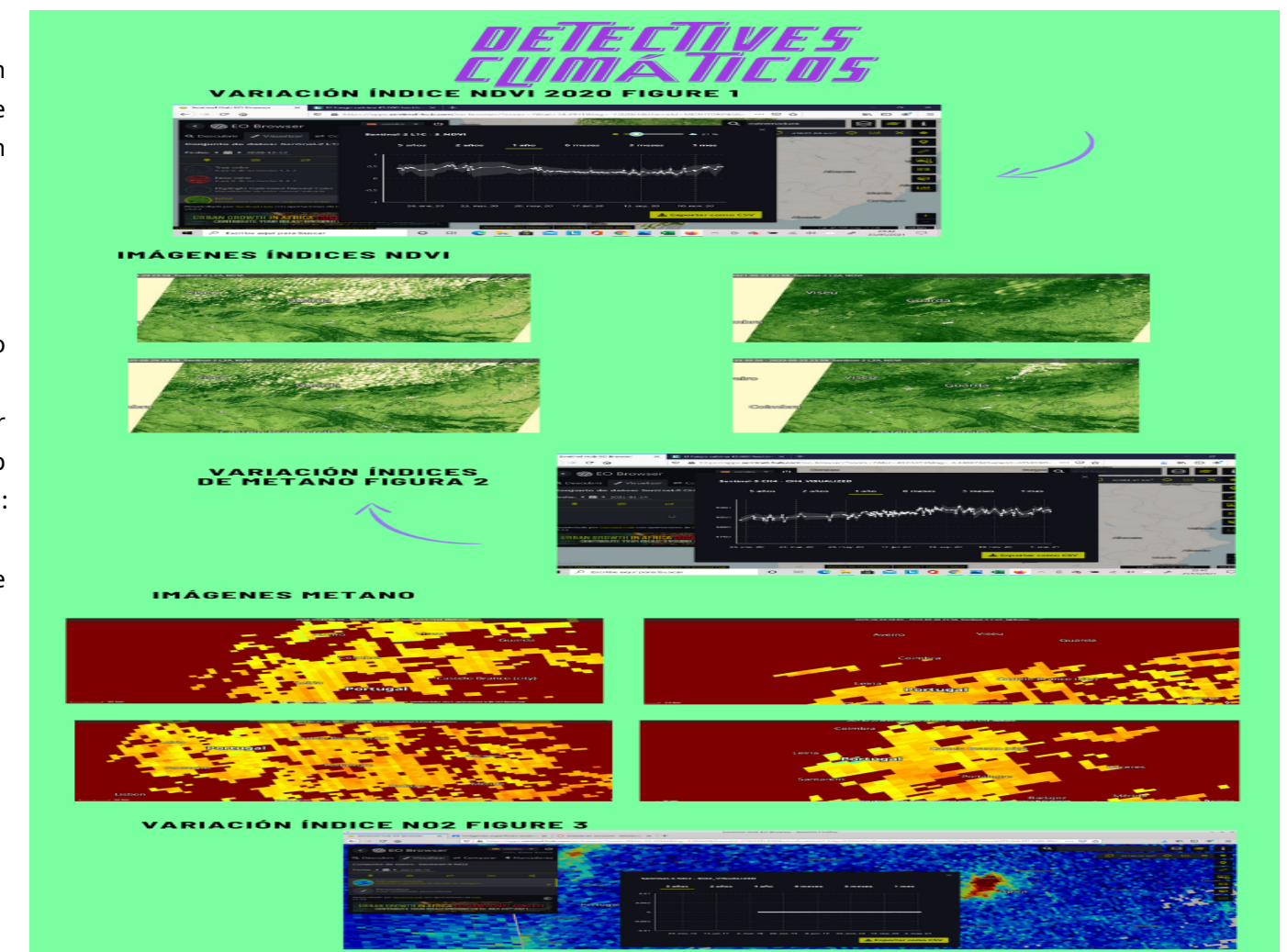


Figure 2:

### ACTIONS TO HELP LESSEN TO THE PROBLEM

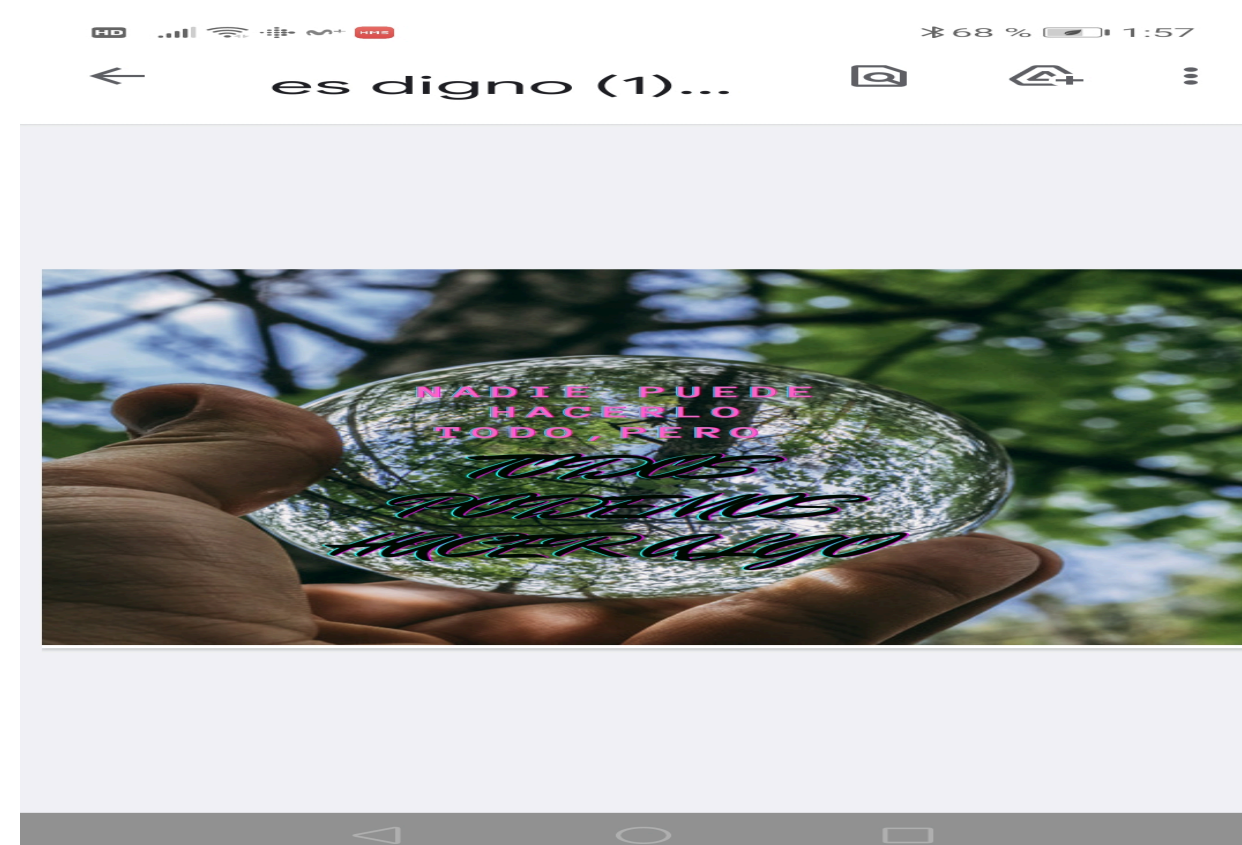


Figure 3: CAMPAÑAS DE DIFUSIÓN

Since the very first moments of the project, we wanted to guide our students to become real change makers. They will start to help to reduce the impact of climate change in the world starting in their homes, their school, their region... We clearly saw that it was extremely necessary to spread the word among their classmates, families, and political figures involved in this challenge, so we started to work on it. We installed a recycling site in each class where we can separate waste collection and recycle-- plastic and cans go in the yellow bin, paper in the blue bin and food waste in the brown one.

We also have an eco point in the hall of our high school for batteries, lightbulbs and small electrical items. Moreover, we have collaborated with a regional business called La Hormiga Verde that actively works in improving the planet through recycling practices (<https://www.lahormigaverde.org/es/nosotros>)

Additionally, we started different campaigns among our colleagues with concrete ideas so every person can initiate their own change. We have become UN ambassadors in our school center, collaborating with the campaign ACT NOW (<https://www.un.org/en/actnow>) We have conducted different workshops to foster the reuse of daily materials and goods